Integrated Water Quality and Aquatic Communities Protocol – Wadeable Streams

Standard Operating Procedure (SOP) #11: Periphyton Sample Collection

Draft Version 1.0

Revision History Log:

Previous Version	Revision Date	Author	Changes Made	Reason for Change	New Version

This SOP describes the method for the collection of periphyton. Periphyton is the biofilm composed of algae, fungi, bacteria, protozoa, and organic matter associated with aquatic substrates. Periphyton are useful indicators of environmental condition because they respond rapidly, are sensitive to a number of anthropogenic influences, and are an overall indication of stream autochthonous productivity. Periphyton is collected at every transect, from A to K (11 total). The samples are then composited into a single sample for processing.

Labeling

Using an electronic label maker, create two labels with the following information: Stream name, Stream code, Park code, Date (yyyymmdd format), Sample type, and County/state. Sample type should read: "Periphyton Biomass" and "Chlorophyll." Sample labels are shown in Figure 1. Attach each label to a plastic scintillation vial.

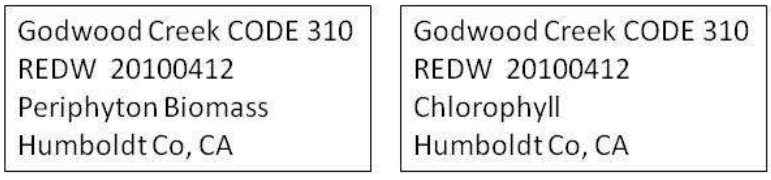

Figure 1. Examples of labels for periphyton samples.

Sample Collection

1. Start at Transect A. Determine the location of the first sample by glancing at the two digits of the minutes reading on a digital or analog watch (00-19 seconds = Left Center; 20-39 seconds. = Center; 40-59 seconds. = Right Center. The "Substrate Cross Sectional

Info" section of SOP #12: Physical Habitat Characterization has a description of the exact location that corresponds with descriptions given here.). Subsequent samples at cross-section transects should follow the order of Left Center, Right Center, Center. For example, if the first sample taken at Transect A is taken at 9:10:15 AM, it should be taken at the Left Center location; Transect B taken at Right Center location; Transect C taken at Center location; Transect D taken at Left Center Location; and so forth.

2. Two types of samples are taken depending on the substrate composition:
    a. Erosion zones (i.e., riffles, runs) where cobbles/gravel are the dominant substrates.
        i. Collect a sample of substrate from the section of the transect denoted in step 1 (ideally a tennis ball-sized cobble that can easily be removed from the stream). Note that if no cobble is available, wood can also be used.
        ii. Place the substrate in a plastic funnel that drains into a 500 mL plastic bottle.
        iii. Use the area delimiter to define a 12 cm^2 area on the **upper surface** of the cobble or rock.
        iv. Start by scraping with a scalpel blade to dislodge large periphyton, and follow-up by scrubbing the area with a stiff toothbrush until the periphyton has been removed.
        v. Use a wash bottle with stream water to wash the scraped periphyton into the collection bottle. **Use minimal water.**
        vi. **Note: If the toothbrush has become worn out to the point of working ineffectively, replace with a new one. If in doubt, replace.**
        vii. Leave substrate on shore and proceed to the next transect.
    b. Depositional zones (i.e., pools) where sand, silt, or other fines are dominant.
        i. Using the 12 cm^2 area delimiter to define the fine substrate, use a 60 mL syringe to vacuum up approximately the top 1 cm of sediments. The tip should be cut off the syringe to facilitate this.
        ii. Add this collected sediment to the 500 mL collection bottle.
        iii. Proceed to the next transect.
3. When all 11 transects have been sampled, return to the X-Point (or other processing area) for sample processing.

Sample Processing

1. Transfer the accumulated sample to a graduated cylinder and **record the total volume of the composite sample**.
2. Pour back into the bottle or a shallow tray and mix thoroughly. Work quickly, as direct sunlight can degrade chlorophyll *a* and algal biomass.
3. Using the filter apparatus from SOP #8: Water Chemistry Sample Collection and Processing, assemble the apparatus using a Whatman Glass-Fiber Filter (GF/F).

SOP #11. Periphyton Collection (continued).

4. Using a 60 mL syringe, take a 25 mL aliquot from the mixed composite sample.
    a. Note: if fine sediment exists, allow the sediment to settle and do not uptake any as part of the aliquot.
5. Filter the 25 mL through the filter using firm, steady pressure. If too much pressure is used, the filter and algal cells can rupture, biasing the sample.
6. Remove the filter, fold on itself, cover in foil, and place in the "Periphyton biomass" scintillation vial.
7. Repeat steps 2 through 6 for the Chlorophyll *a* sample, substituting a mixed cellulose ester membrane filter (0.45 µm, 47 mm diameter, plain white surface, HAWP 047-00 manufacturer number) for the Glass Fiber filter, and place in the "Chlorophyll" scintillation vial.
8. Place both samples in a dark, cool place (with the water samples) and place in a freezer as soon as possible.